COMMUNITY SAFETY

AN ELEMENT OF THE GENERAL PLAN OF THE
CITY AND COUNTY OF SAN FRANCISCO

Planning Department of the City and County of San Francisco
Adopted April 1997

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PLANNING DEPARTMENT
CITY AND COUNTY OF SAN FRANCISCO
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COMMUNITY SAFETY ELEMENT

The Community Safety Element was originally adopted by City Planning Commission Resolution 7241 on September 12, 1974. The revised version was adopted by Planning Commission Resolution 14354 on April 24, 1997 and approved by the Board of Supervisors Resolution 758-97 on August 15, 1997.

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1. COORDINATION

OBJECTIVE 1

IMPROVE THE COORDINATION OF CITY PROGRAMS THAT MITIGATE PHYSICAL HAZARDS, HELP INDIVIDUALS AND ORGANIZATIONS PREPARE FOR AND RESPOND TO DISASTERS, AND RECOVER FROM THE IMPACTS OF DISASTERS

POLICY 1.1

Improve the coordination of disaster-related programs within City departments.

2. HAZARD MITIGATION

OBJECTIVE 2

REDUCE STRUCTURAL AND NON-STRUCTURAL HAZARDS TO LIFE SAFETY, MINIMIZE PROPERTY DAMAGE AND RESULTING SOCIAL, CULTURAL AND ECONOMIC DISLOCATIONS RESULTING FROM FUTURE DISASTERS.

NEW STRUCTURES

POLICY 2.1

Assure that new construction meets current structural and life safety standards.

POLICY 2.2

Review and amend at regular intervals all relevant public codes to incorporate the most current knowledge of structural engineering.

POLICY 2.3

Consider site soils conditions when reviewing projects in areas subject to liquefaction or slope instability.

EXISTING STRUCTURES

POLICY 2.4

Continue the unreinforced masonry building program and the parapet program.

POLICY 2.5

Assess the risks presented by other types of potentially hazardous structures and reduce the risks to the extent possible.

POLICY 2.6

Reduce the earthquake and fire risks posed by older small wood-frame residential buildings through easily accomplished hazard mitigation measures.

POLICY 2.7

Abate structural and non-structural hazards in City-owned structures.

POLICY 2.8

Preserve, consistent with life safety considerations, the architectural character of buildings and structures important to the unique visual image of San Francisco, and increase the likelihood that architecturally and historically valuable structures will survive future earthquakes.

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POLICY 2.9

Consider information about geologic hazards whenever City decisions that will influence land use, building density, building configurations or infrastructure are made.

LIFELINES

POLICY 2.10

Identify and replace vulnerable and critical lifelines in high-risk areas.

POLICY 2.11

Reduce hazards from gas fired appliances and gas lines.

HAZARDOUS MATERIALS

POLICY 2.12

Enforce state and local codes that regulate the use, storage and transportation of hazardous materials in order to prevent, contain and effectively respond to accidental releases.

3. EMERGENCY PREPAREDNESS AND RESPONSE

OBJECTIVE 3

ENSURE THE PROTECTION OF LIFE AND PROPERTY FROM DISASTERS THROUGH EFFECTIVE EMERGENCY RESPONSE. PROVIDE PUBLIC EDUCATION AND TRAINING ABOUT EARTHQUAKES AND OTHER NATURAL DISASTERS AND HOW INDIVIDUALS, BUSINESSES AND COMMUNITIES CAN REDUCE THE IMPACTS OF DISASTERS.

POLICY 3.1

Promote greater public awareness of disaster risks, personal and business risk reduction, and personal and neighborhood emergency response.

POLICY 3.2

Provide on-going disaster preparedness and hazard awareness training to all City employees.

POLICY 3.3

Maintain a local organization to provide of emergency services to meet the needs of San Francisco.

POLICY 3.4

Maintain a comprehensive, current Emergency Operations Plan, in compliance with applicable state and federal regulations, to guide the response to disasters. Conduct periodic exercises of the EOP.

POLICY 3.5

Maintain an adequate Emergency Command Center.

POLICY 3.6

Maintain and expand the city's fire prevention and fire fighting capability with adequate personnel and training. Assure the provision of adequate water for fighting fires.

POLICY 3.7

Establish a system of emergency access routes for both emergency operations and evacuation.

4. RECOVERY AND RECONSTRUCTION

OBJECTIVE 4

ASSURE THE SOUND, EQUITABLE AND RAPID RECONSTRUCTION OF SAN FRANCISCO FOLLOWING A MAJOR DISASTER.

POLICY 4.1

Rebuild after a major disaster in accordance with established General Plan objectives and policies and other relevant policies and regulations.

POLICY 4.2

Repair and reconstruct damaged neighborhoods so that displaced residents are able to return to the communities where they lived. Involve pre-disaster residents, businesses, and owners in planning for the reconstruction of destroyed and damaged areas.

POLICY 4.3

Provide adequate interim accommodation for residents and businesses displaced by a major disaster in ways that maintain neighborhood ties and cultural continuity to the extent possible.

POLICY 4.4

Before an emergency occurs, establish an interdepartmental group to develop a Recovery Plan to guide long-term recovery, manage reconstruction activities, and provide coordination among recovery activities.

5. INFORMATION SYSTEMS AND RESEARCH

OBJECTIVE 5

SUPPORT SEISMIC RESEARCH THROUGH APPROPRIATE ACTIONS BY ALL PUBLIC AGENCIES, AND APPLY NEW KNOWLEDGE AS IT BECOMES AVAILABLE.

POLICY 5.1

Participate actively in the State of California, Department of Conservation, Division of Mines and Geology's Seismic Hazard Mapping project.

POLICY 5.2

Support and monitor research being conducted about the nature of seismic hazards in the Bay Area, including research on earthquake prediction and warning systems, on the risk of tsunamis, and on the performance of structures.

COMMUNITY SAFETY

INTRODUCTION

The purpose of the *Community Safety Element* is to reduce future loss of life, injuries, property loss, environmental damage, and social and economic disruption from natural or technological disasters. There are several assumptions behind this Element:

- Creating a greater public awareness of the hazards that face San Francisco will result in an informed commitment by public agencies, private organizations and individuals to prepare for future disasters.

- Development and implementation of programs to increase safety and to respond to emergencies are the responsibility of many different agencies. Cooperation among City and County agencies, federal and state agencies, community-based organizations, and the private sector is essential for these programs to be effective.

- New development must be undertaken in ways that minimize risks from natural hazards.

- Existing hazardous structures have the greatest potential for loss of life and other serious impacts as a result of an earthquake. The City should continue to explore ways to reduce this risk.

The *Community Safety Element* focuses on seismic hazards, because the greatest risks to life and property in San Francisco result directly from the ground shaking and ground failure associated with large earthquakes. Other hazards common in other California communities are less likely to occur in San Francisco, and when they do occur are most likely to be associated with an earthquake. If San Francisco undertakes programs to reduce the ground failure, inundation, landslides, hazardous materials releases and fire that are quite likely to accompany a major earthquake, and if it has developed effective emergency response plans, it will be well prepared to cope with these hazards, or other catastrophes that threaten public safety, property, or the environment when they occur alone.

There are two documents related to this *Community Safety Element*. A *Summary Background Report* describes the natural hazards facing San Francisco and the programs currently in place to address them. The *Community Safety Element* is based on this background information. *Implementation Programs* describes current and proposed projects to carry out the Objectives and Policies contained here.

RELATIONSHIP TO OTHER PLANS AND PROGRAMS

Emergency Operations Plan

In addition to the Safety Element, the City maintains an *Emergency Operations Plan*. The *Emergency Operations Plan* was updated in 1996 by a task force with representatives of City departments and other agencies with responsibilities during emergencies, coordinated by the Mayor's Office of Emergency Services. This process and its results are described in more detail in the *Summary Background Report* to the *Community Safety Element*.

The *Emergency Operations Plan* describes specific response actions that will be taken by the emergency response agencies, and other City departments in their support, in the aftermath of a disaster, and provides for a coordinated response. The *Community Safety Element* contains broader policies to reduce impacts, occurring over a longer time frame, that will need to be carried out by the Planning Commission and other City agencies. The *Emergency Operations Plan* implements many of the emergency response policies of this *Community Safety Element*. Both documents address issues related to the recovery from a disaster: the *Emergency Operations Plan* establishes programs and procedures to assure the resumption of daily activities, while the *Community Safety Element* establishes policies to guide the longer-term reconstruction of the City. Both of these documents recognize that a more detailed plan is needed to coordinate efforts to guide the long-term recovery of the City, its residents, and its economy after a major disaster. Because the *Community Safety Element* and the *Emergency Operations Plan* were prepared at the same time, attempts were made to coordinate their content to avoid duplication or contradictions.

Hazard Mitigation Plan

Another related plan is the *Hazard Mitigation Plan*, required by federal law as a condition of receiving hazard mitigation grants after a declared disaster. The City prepared a *Hazard Mitigation Plan* after the 1989 Loma Prieta earthquake. It was developed by an inter-departmental team coordinated by the Chief Administrative Officer, and adopted by the Board of Supervisors in 1990. It contained background information similar to the *Community Safety Element*, and a list of earthquake mitigation projects proposed by City departments. The *Hazard Mitigation Plan* was updated, to include the projects proposed to reduce hazards from high wind and storms, such as occurred during the winter of 1995-1996, which was a declared disaster in San Francisco. That update is expected to cover the declared disasters of the January 1997 storms.

Seismic Hazards Mapping Act

In 1990 the California Legislature enacted the Seismic Hazards Mapping Act. As a result, the California Division of Mines and Geology (CDMG) is currently mapping Seismic Hazards Studies Zones (SHSZs). A preliminary map showing areas with a potential for liquefaction during an earthquake was released for local review in October 1996 (Map 4). The State Geologist expects to issue official maps and guidelines on April 1, 1997. These maps are posted with the Recorder, the Assessor and the Planning Commission. The Seismic Hazards Mapping Act is described in more detail in the *Summary Backround Report.*

When development projects are proposed within the SHSZs, the proponent is required to conduct a site investigation and prepare a geotechnical report assessing the nature and severity of the hazard, and suggesting appropriate mitigation measures. When approving any project in a SHSZ, the City will use the information and recommendations included in the report to achieve a reasonable protection of public safety.

The City must take the information contained in the maps into account when preparing the Safety Element, or when adopting or revising land use ordinances. Because SHSZ maps are currently being prepared by the CDMG, no new geological research has been conducted for this Safety Element update. CDMG staff have consulted with City staff as the maps are being developed, and have already shared their preliminary information. When the final maps are issued, the Safety Element will be reviewed in light of any new information contained in the official maps. Revisions will be made if appropriate.

NATURAL HAZARDS IN SAN FRANCISCO

The greatest risks to life and property in San Francisco result directly from the ground shaking and ground failure associated with large earthquakes. Other hazards common in other California communities are less likely to occur in San Francisco, and when they do occur are usually, but not always, associated with an earthquake.

San Francisco is not subject to flooding of natural waterways. (The National Flood Insurance Program, which designates flood-prone areas, has identified no areas in San Francisco.) Flooding as a result of dam or reservoir failure is unlikely, and is most likely to occur as a result of an earthquake. San Francisco does not have the conditions for large, devastating wild land fires. Urban fires are a constant threat, and the worst case urban fire is conflagration associated with an earthquake. Slope instability resulting in landslides is a hazard in San Francisco. It can occur in times of high wind and heavy rain. Widespread damaging landslides are most likely if triggered by earthquake. Other potential hazards are substantially increased if they occur during a large earthquake. A hazardous materials release can be dangerous under any conditions. During an earthquake the risk, and the difficulty in responding to the risk, is much greater.

If San Francisco undertakes programs to reduce the ground failure, inundation, landslides, hazardous materials releases and fire that are quite likely to accompany a major earthquake, and if it has developed effective emergency response plans, it will be well prepared to cope with these hazards, or other unforeseen catastrophes that threaten public safety or property, when they occur alone.

Earthquakes have always occurred in the San Francisco area and will continue to occur in the future. There is a historical record of damaging earthquakes dating as far back as 1808. Although few magnitude 6 or greater earthquakes occurred between 1906 and the late 1970s, many scientists believe that higher frequency of earthquakes since 1979 may represent a return to the higher rates of activity recorded before 1906.

The great 1906 earthquake and the fire that it caused resulted in about 3,000 deaths. The worst building damage occurred on "made land": artificially filled areas created on former marshes, streams and bay. Wood-frame buildings in the South of Market area, and brick buildings downtown, were especially heavily damaged. Large ground displacements in the filled ground along the Bay damaged utilities. Damage to the gas generating and distribution system resulted in explosions and exacerbated the spread of fire. Breaks in the underground water pipes resulted in a loss of fire fighting capability. More than 28,000 buildings within a four square mile area were destroyed over a period of three days. About 100,000 people were left homeless. Refugee camps in parks and other open spaces continued for many months. A 1908 estimate of private property damage in the fire zone was $1 billion. Some of the municipal bonds that financed the rebuilding of public facilities were not paid off until the 1980s.

The October 17, 1989 Loma Prieta earthquake occurred on the San Andreas fault about 60 miles (100 km) southeast of San Francisco. Sixty-two people were killed, including eleven in San Francisco. Forty-two of these fatalities occurred because of failures of bridges and freeways. Most of the remaining deaths resulted from the collapse of buildings in Santa Cruz and San Francisco. The total damage to private and

public facilities throughout the region is estimated at more than $6 billion. Again, the damage was not evenly distributed through the city. Much of the severe damage occurred in the same areas that suffered in 1906, those built on unengineered artificial fill in the Marina and South of Market districts. Many buildings severely damaged by the earthquake had structural weaknesses known to make them vulnerable to earthquake damage. They included buildings with "soft stories" (large openings and inadequate strength at the ground story) and unreinforced masonry buildings. About 130 buildings in San Francisco, containing more than 1,000 housing units, were destroyed or irreparably damaged. Many more could not be occupied for an extended length of time while repairs were carried out. Additional residents were displaced temporarily by a lack of utilities. The Red Cross provided overnight shelter for about 2,000 people on the night of the earthquake.

After the October 1989 Loma Prieta Earthquake, the National Earthquake Prediction Evaluation Council formed a Working Group of earthquake scientists to assess the probabilities of large earthquakes in the Bay Area. The Working Group assessed the likelihood of one or more major earthquakes (magnitude 7 or greater and capable of resulting in substantial damage) in the Bay Area between 1990 and 2020. They concluded that there is a 67% chance that one or more large earthquakes will occur somewhere in the Bay Area by the year 2020. This means that a major quake is twice as likely to occur as it is not to occur. Most of our existing structures and infrastructure, and most of the new buildings and public works now contemplated, will probably be in place when the expected earthquake happens.

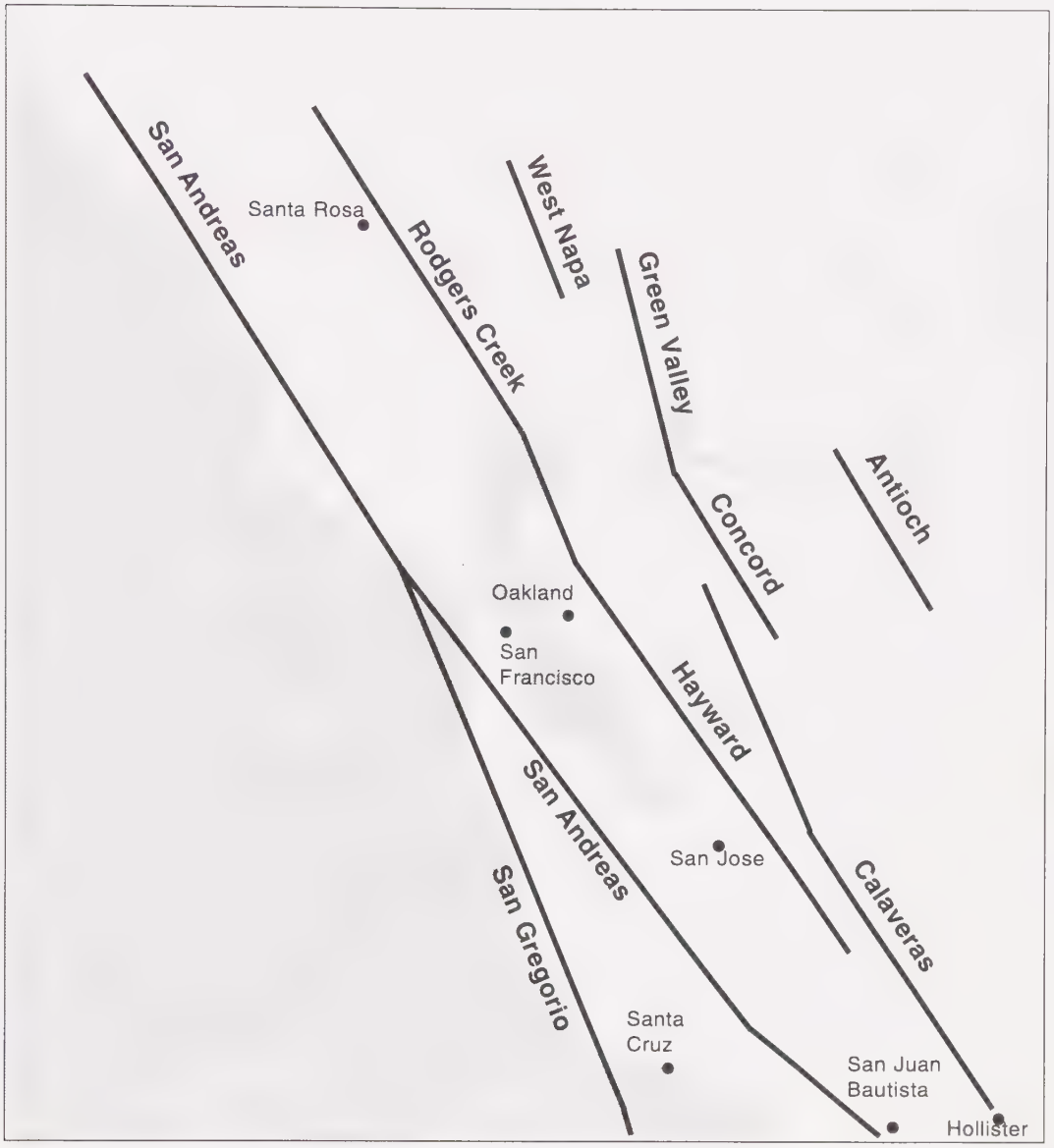
SAN FRANCISCO GEOLOGY AND SEISMICITY

The San Andreas fault system is a complex network of faults that extends throughout the Bay area. (See Map 1.) While no known active faults exist in San Francisco, major earthquakes occurring on the faults surrounding the City have resulted in substantial damage within the City. Similar damaging earthquakes in the future are inevitable.

Some of these faults are found beneath or close to the most heavily populated parts of the Bay Area. As a result, earthquakes on these faults could be much more damaging than the Loma Prieta earthquake, even if the magnitude is smaller. The Northridge earthquake of 1994 and the Kobe earthquake of 1995 illustrate how destructive earthquakes very close to urban areas can be. The Northridge earthquake, with a magnitude of 6.8 resulted in about 60 deaths and the severe or total damage to about 3000 buildings. The Kobe earthquake had a magnitude of 6.8 and resulted in more than 5,000 deaths and the loss of about 60,000 buildings, including those destroyed by fire.

The location and movement of earthquake faults do not explain all of the earthquake risk. Even in locations that are relatively far from faults, soils can intensify ground shaking, or the ground may settle or slide. The parts of San Francisco that experienced the greatest damage in 1989 were not those closest to Loma Prieta, but those with soils that magnified ground shaking or liquefied. These were the same areas that experienced damage in 1906, though the epicenter of the 1906 earthquake was in a different direction.

The hills along the central spine of the San Francisco peninsula are composed of rock and soils that are less likely to magnify ground shaking, although they are sometimes vulnerable to landsliding during an earthquake. The soils most vulnerable during an earthquake are in low-lying and filled land along the Bay, in low-lying valleys and old creek beds, and to some extent, along the ocean.

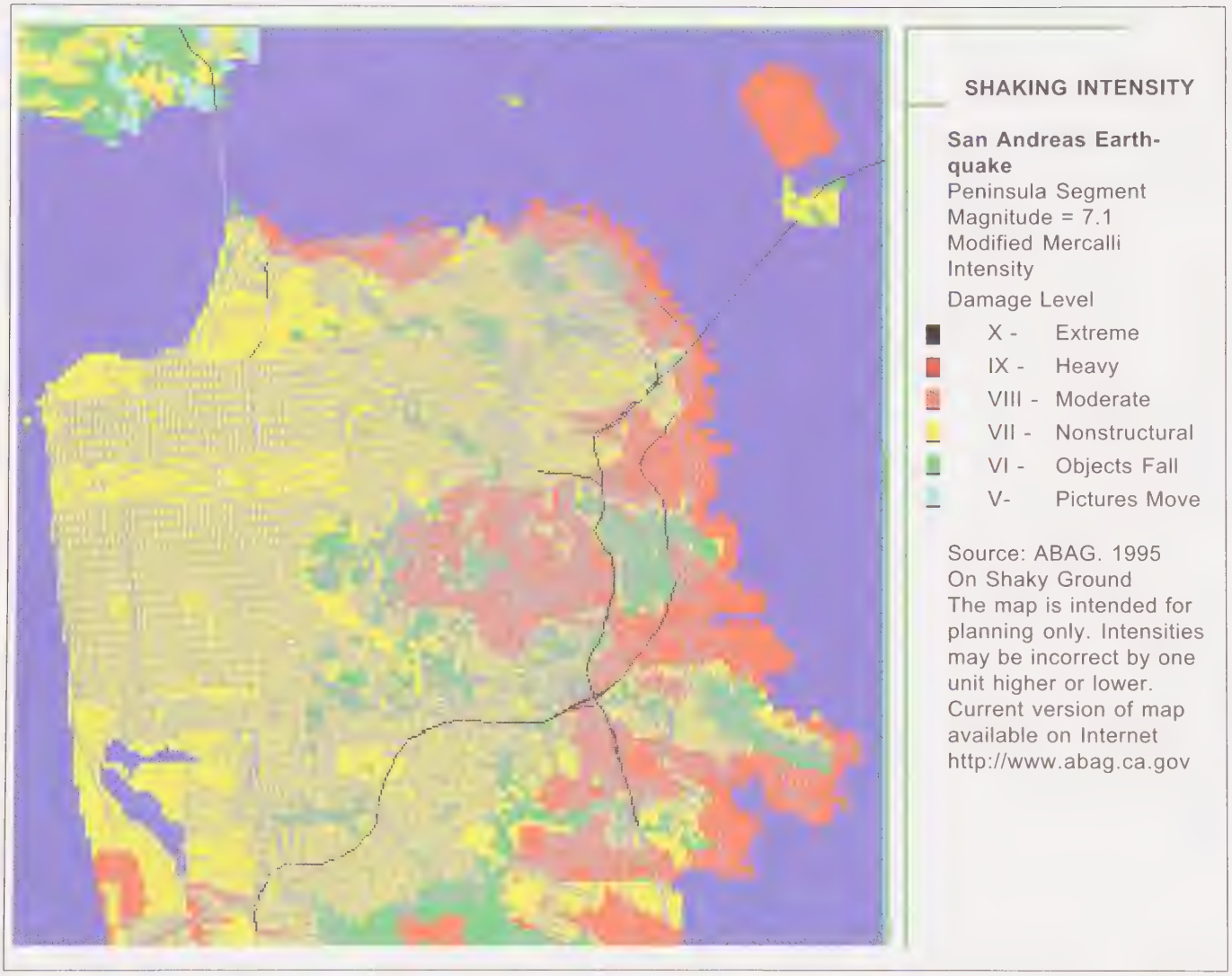


Map 1
Bay Area Earthquake Faults

GROUND SHAKING

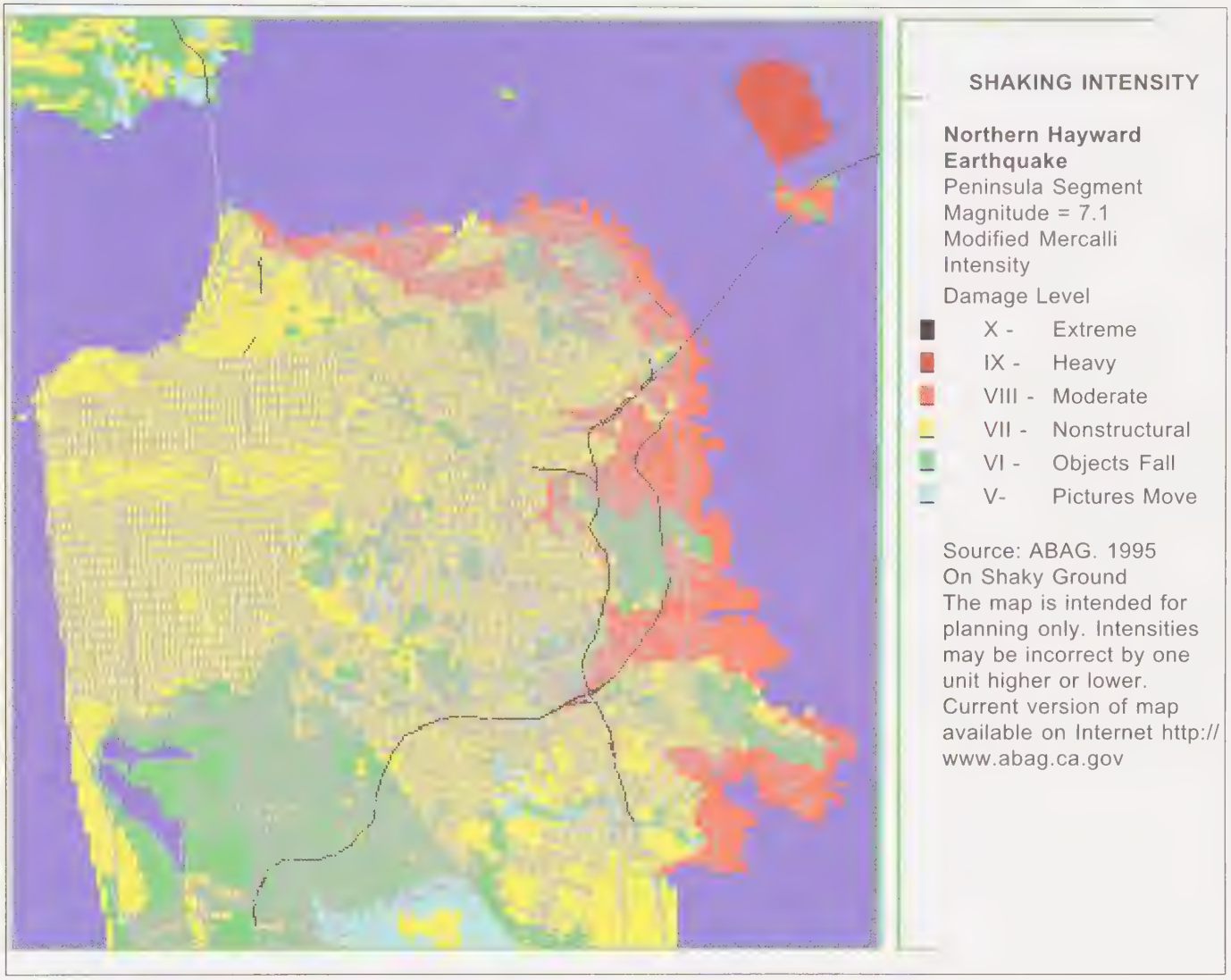
Most earthquake damage comes from ground shaking. Ground shaking occurs in all earthquakes. All of the Bay area and much of California are subject to some level of ground shaking hazard. The impacts of ground shaking will be quite widespread. The severity of ground shaking varies considerably over the impacted region depending on the size of the earthquake, the distance from the epicenter of the earthquake, the nature of the soil at the site, and the nature of the geologic material between the site and the fault.

Intensity maps for two of the most probable earthquakes, magnitude 7 on the San Andreas fault, and magnitude 7 on the northern segment of the Hayward fault, are shown on Map 2 and Map 3. A comparison of these maps shows that the intensities of ground shaking will vary considerably throughout the City



Map 2

Ground Shaking Intensity, Magnitude 7.1 earthquake on the Peninsula segment of the San Andreas fault



Map 3

Ground Shaking Intensity, Magnitude 7.1 earthquake on the Northern segment of the Hayward fault

during any given earthquake, and that the pattern of groundshaking is fairly consistent, reflecting the underlying soils. In general, sites with stronger soils will experience shaking of less intensity than those in low-lying areas and along the Bay, with Bay mud or other weaker soils. Some sites, particularly those with poor soils, will experience strong ground shaking in most earthquakes.

GROUND FAILURE

"Ground failure" means that the soil is weakened so that it no longer supports its own weight or the weight of structures. Ground failure can happen without earthquakes. For example, landsliding is a natural geological process. It is also likely to occur suddenly and catastrophically during earthquakes. The major types of ground failure associated with earthquakes are liquefaction, landslides, and settlement.

Liquefaction

Liquefaction is the transformation of a confined layer of sandy water-saturated material into a liquid-like state because of earthquake shaking. When soil liquefies during an earthquake, structures no longer supported by the soil can tilt, sink or break apart. Underground utilities can be substantially damaged.

Liquefiable soils in San Francisco are generally found in filled areas along the Bay front and former Bay inlets, and in sandy low-lying areas along the ocean front and around Lake Merced.

The California Department of Conservation, Division of Mines and Geology (CDMG) is preparing maps of areas of liquefaction potential, as required by the Seismic Hazard Mapping Act of 1990. These maps, once they are officially adopted, must be used by the City when preparing the Safety Element and when adopting land use plans. Development proposals within the Seismic Hazards Zones shown on the official maps must include a geotechnical investigation and must contain design and construction features that will mitigate the liquefaction hazard.

Map 4 shows the areas with liquefaction potential in the USGS San Francisco North Quadrangle, which includes the north end of the San Francisco peninsula, extending south to about 25th Street and Pacheco Street. This map was issued in October 1996 for public review. CDMG expects to finally adopt this map on April 1.

Landslides

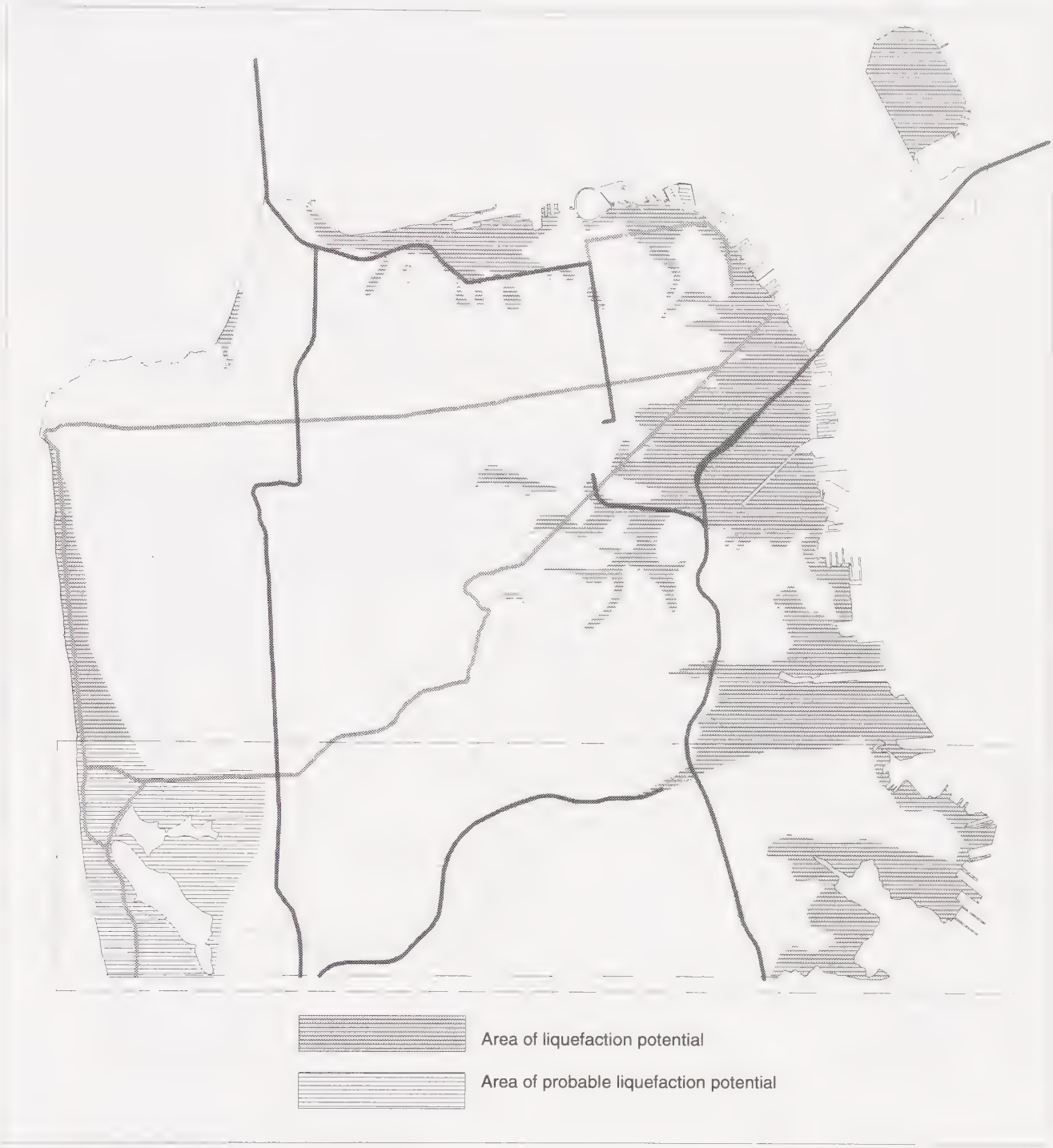
A landslide is a movement of a mass of soil down a steep slope when the soil loses strength and can no longer support the weight of overlying soil or rocks. Landslides vary in size and rate of movement. They can occur slowly over time or suddenly. Areas susceptible to landslides are those where masses of soils are weakly supported because of natural erosion, changes in ground water or surface water patterns, or human activities such as undercutting. Landslides can be triggered by heavy rains, as occurred during the high wind and rainstorms of the winter of 1995-1996 and in early 1997. Earthquakes will trigger landslides in susceptible areas, as occurred in the Santa Cruz Mountains during the 1989 Loma Prieta earthquake.

A large earthquake in San Francisco may cause movement of active slides and could trigger new slides similar to those that have already occurred under normal conditions. Areas susceptible to landslides are shown on Map 5.

INUNDATION HAZARDS

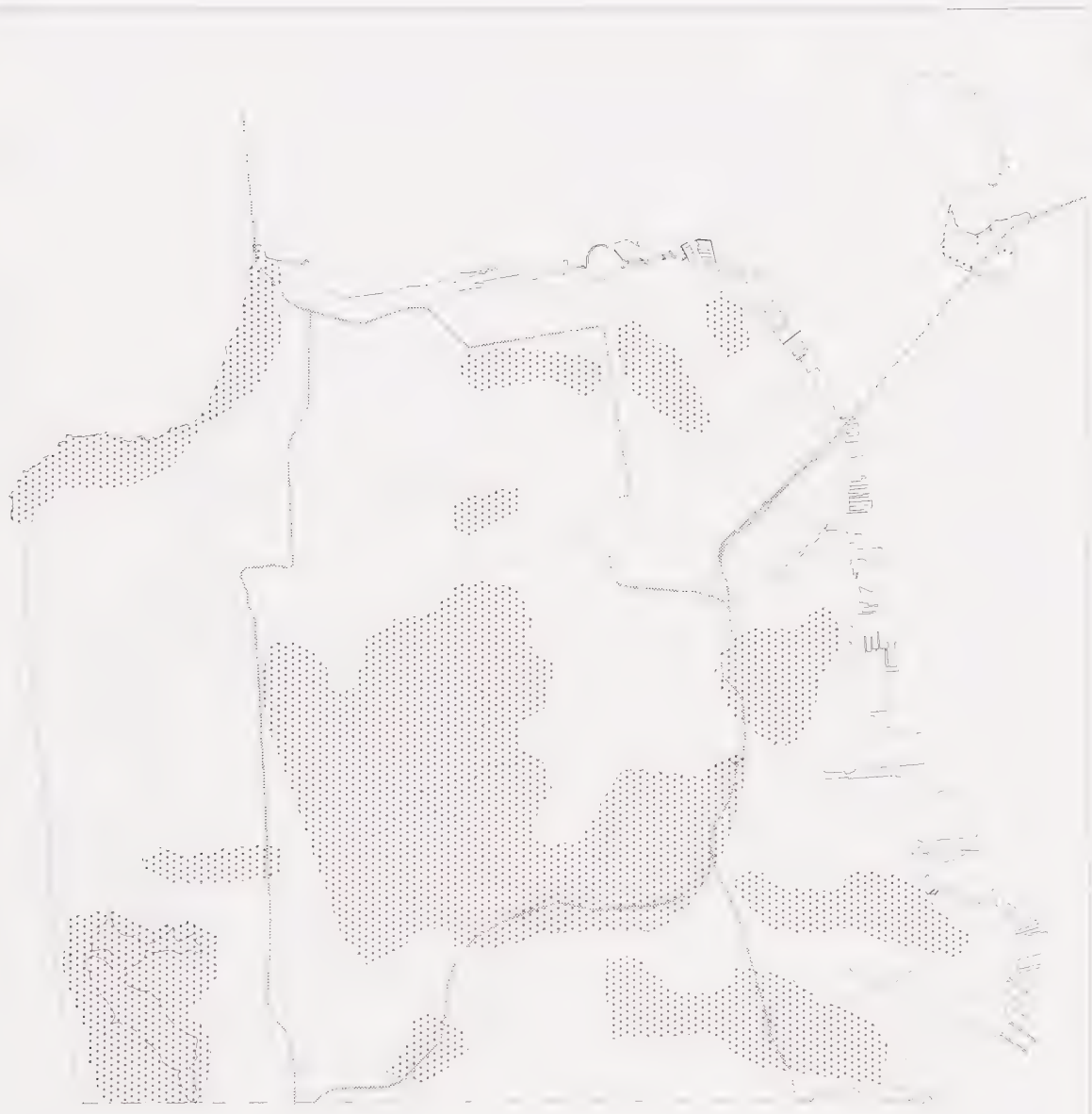
Tsunami

Tsunami are large waves in the ocean generated by earthquakes, coastal or submarine landslides, or volcanoes. Damaging tsunami are not common on the California coast. Most California tsunami are associated with distant earthquakes (most likely those in Alaska or South America), not with local earthquakes. Devastating tsunamis have not occurred in historic times in the Bay area. Because of the lack of reliable information about the kind of tsunami runups



Map 4
Seismic Hazards Study Zones - Areas of Liquefaction Potential

Sources: *San Francisco North Quadrangle, California Department of Conservation Division of Mines and Geology, 1997.*
San Francisco South Quadrangle, URS/John Blume and Associates, 1974.



Areas of potential landslide hazard

Map 5

Areas Susceptible to Landslides

Sources: URS/John Blume & Associates, 1974.
Treasure Island, Treadwell and Rollo, 1995

that have occurred in the prehistoric past, there is considerable uncertainty over the extent of tsunami runup that could occur. There is ongoing research into the potential tsunami run-up in California. Map 6 shows areas where tsunamis are thought to be possible.

Flooding

The National Flood Insurance Program designates flood prone areas. There are no areas prone to surface flooding in San Francisco.

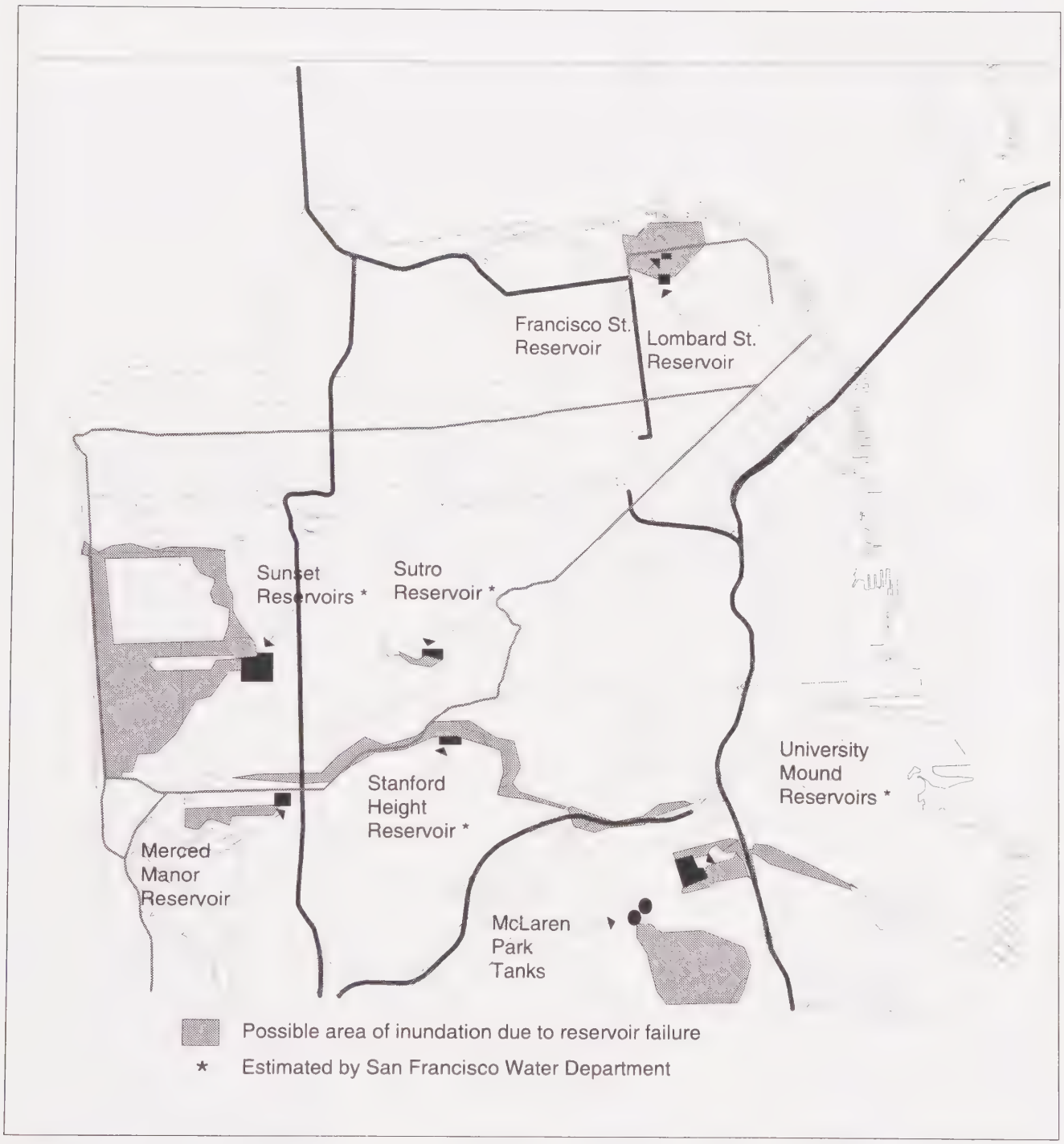
Reservoir Failure

Dams and reservoirs which hold large volumes of water represent a potential hazard due to failure caused by ground shaking. The San Francisco Water Department owns above ground reservoirs and tanks within San Francisco. Their inundation areas are shown in Map 7. The San Francisco Water Department monitors its facilities and submits periodic reports to the California Department of Water Resources, Division of Safety of Dams (DOSD), which regulates large dams.

Map 6 Areas of potential inundation.

20-foot Tsunami run-up map

Source: Maps showing areas of potential inundation by tsunamis in the San Francisco Bay Region, United States Geological Survey, 1972.



Map 7

Inundation Areas Due to Reservoir Failure

Source: URS/John Blume & Associates, 1974.

IMPACTS OF FUTURE EARTHQUAKES

Earthquakes' most profound impacts are deaths and serious injuries. Deaths and injuries largely depend on the number of people in the area at the time, and the types of structures that they occupy. Although risk is related to much more than distance from the earthquake, it is interesting to note that about 1.26 million people live within 10 km of the likely magnitude 7 earthquake on the Northern segment of the Hayward fault. This is about 10 times the number of people at a similar distance from the epicenter of the Loma Prieta earthquake.

Most deaths and injuries will result from the failure of buildings and other structures. The number of casualties will be influenced by the time of day of the earthquake. At night more people are in relatively safe small wood-frame structures. San Francisco's residential population of about 750,000 is a reasonable estimate of nighttime population. During the day more people could be in more hazardous and higher occupancy buildings, on vulnerable bridges and freeways, or on streets with falling debris. San Francisco's daytime population is about 1.3 million people. Studies have estimated the number of deaths from a magnitude 7.5 earthquake on the Hayward fault at 1,500 to 4,500, and from an 8.3 earthquake on the San Andreas fault at 3,000 to 8,000.

In recent large earthquakes, buildings built with current engineering techniques generally performed well. This means that they did not collapse or pose an unreasonable threat to the lives of occupants, although they may have suffered structural damage that is difficult, expensive or even impossible to repair. San Francisco contains many building built before building codes and construction practices reflected a knowledge of earthquake resistance.

Unreinforced masonry buildings have performed poorly in earthquakes. San Francisco has adopted a program to require their retrofit. Other hazardous building types remain. Non-ductile concrete structures often fail in large earthquakes. A large but unknown number of them exist in San Francisco. Reducing this possibly large risk may be difficult and costly. "Soft-story" buildings, those in which at least one story—often the ground floor— has much less strength that the rest of the structure, are significant hazards. Retrofitting wood-frame buildings with soft stories by strengthening their ground floor can be a relatively simple, and very effective, way to reduce earthquake risks.

San Francisco is improving the seismic strength of many City-owned buildings, including fire stations and Civic Center buildings. Some important buildings remain to be strengthened.

A major earthquake will result in substantial damage to utility systems. It is likely that fires will break out, larger and in greater number than can be controlled by available professional fire-fighters. There may be releases of hazardous materials.

In addition to these physical impacts, there will be social and economic impacts. Housing will be lost; the Association of Bay Area Governments estimated that up to 41,000 units (or 12% of all units) in San Francisco could be uninhabitable immediately after the largest expected earthquake. About 50,000 people would seek shelter. Some people, because of limited English language ability, or limited mobility, may be at increased risk. Many businesses will be seriously disrupted. Valuable historic buildings will be lost.

OVERALL GOAL

It is the goal of the City and County of San Francisco to the extent feasible, to avoid the loss of life and property as a result of natural and technological disasters, to reduce the social, cultural and economic dislocations of disasters, and to assist and encourage the rapid recovery from disasters.

Objectives and Policies to advance this goal are classified into six general categories. They are:

- *Coordination.* Improvements in coordination among City programs, and among others working to reduce the risks of disasters will result in more effective mitigation, preparedness, response and recovery efforts.

- *Hazard Mitigation.* Hazard mitigation policies and programs are intended to reduce or eliminate long term risks. Hazard mitigation activities, effectively carried out, reduce the need for response and recovery from disasters because they will reduce the amount of physical damage suffered.

- *Preparedness.* Preparedness programs are those that educate and organize people to respond appropriately to disasters. They include education and awareness programs for individuals, families, institutions, businesses, government agencies and other organizations.

- *Response.* Response programs include the plans of those with responsibility for providing emergency and other services to the public when a disaster occurs. The focus of Response activities is saving lives and preventing injury, and reducing immediate property damage.

- *Recovery and Reconstruction.* After a major disaster, public and private decisions must be made about short-term and long-term rebuilding, the provision of housing for those displaced, resumption of services to homes and businesses, resumption of business and government functions. City policies and actions will have a large influence on these processes.

- *Information Systems and Research.* Knowledge about natural disasters is continually growing. In order the deal with disasters effectively, it is critical that the public, City agencies, and decision-makers be well informed about new information. It is also important that information about events and activities in the City be available to other government agencies and researchers.

1. COORDINATION

OBJECTIVE 1

IMPROVE THE COORDINATION OF CITY PROGRAMS THAT MITIGATE PHYSICAL HAZARDS, HELP INDIVIDUALS AND ORGANIZATIONS PREPARE FOR AND RESPOND TO DISASTERS, AND RECOVER FROM THE IMPACTS OF DISASTERS

Meeting the overall goal of reducing the impacts of natural and technological hazards requires extraordinary cooperation and coordination among City departments, and among City departments and other government and non-government agencies. San Francisco currently has staff assigned to respond to disasters, and to prepare and coordinate emergency response plans both citywide in the Office of Emergency Services and at the departmental level. Other departments and offices carry out projects to reduce future losses to City facilities and some private facilities, programs to increase earthquake preparedness, and to repair damage from the Loma Prieta earthquake. A more comprehensive, coordinated approach increases overall effectiveness of these programs, improves the City's working relationships with other government and non-government agencies, and heightens public awareness of disaster programs.

POLICY 1.1

Improve the coordination of disaster-related programs within City departments.

Since the Loma Prieta earthquake, a focus of City safety efforts has been on improving the response to a major disaster. With the completion of the new *Emergency Operations Plan*, there is considerable progress toward improved response. The City now needs to act to improve the coordination of mitigation and preparedness activities, and more fully support the City's ability to recover after future disasters.

2. HAZARD MITIGATION

OBJECTIVE 2

REDUCE STRUCTURAL AND NON-STRUCTURAL HAZARDS TO LIFE SAFETY, MINIMIZE PROPERTY DAMAGE AND RESULTING SOCIAL, CULTURAL AND ECONOMIC DISLOCATIONS RESULTING FROM FUTURE DISASTERS.

Most earthquake-related deaths and injuries will result from the failure of buildings and other structures as a result of shaking or ground failure. Damage to structures results in substantial economic losses and severe social, cultural and economic dislocations. In addition to the characteristics of the earthquake and of the site, a structure's performance will depend on structural type, materials, design, age and quality of construction and maintenance. The hazards posed by buildings and other structures can be reduced by assuring that new structures incorporate the latest engineering knowledge, by learning more about the risks posed by older structures and developing plans to reduce those risks, and by including a consideration of natural hazards in all land use, infrastructure, and public capital improvement planning.

NEW STRUCTURES

The State of California requires the use of the State Building Code, based on the model Uniform Building Code (UBC) prepared by the International Conference of Building Officials (ICBO). Buildings built to current code provisions are expected to resist damage from minor earthquakes, experience some non-structural damage from moderate earthquakes, and incur non-structural and some structural damage (but not collapse) in major earthquakes. The Codes are updated as knowledge grows about how structures respond to earthquakes. The 1971 San Fernando earthquake unexpectedly destroyed some recently built freeways and buildings. As engineers examined the buildings that failed, there were far-reaching building code amendments increasing buildings' structural resistance to earthquakes. Recent earthquakes in Northridge and Kobe have demonstrated that buildings that incorporate current engineering knowledge about earthquakes generally perform well in earthquakes. During these two earthquakes, some welds in steel frame buildings cracked unexpectedly, although no buildings collapsed as a result. Changes are being made in the Building Code to protect against this damage.

Local governments are permitted to impose more restrictive standards than those in the State codes when this can be justified by local conditions such as seismicity, topography (for example hilly terrain), or climate. San Francisco adopts the State Building Code with modifications which concern the resistance to ground-shaking and hillside construction, as well as some long-standing local provisions. The San Francisco Building Code is adopted by the Board of Supervisors and implemented by the Department of Building Inspection (DBI), which reviews building plans, and inspects buildings under construction to insure that the approved plans and codes are followed. The City will continue to periodically review and update the building code to incorporate the latest knowledge and standards of seismic design in both structural and nonstructural building elements.

Because of the importance and the variability of local soil conditions, DBI requires geotechnical reports, prepared by a licensed civil engineer, for projects on sites in areas with greater susceptibility to ground shaking and ground failure, and requires the design of foundations and structural systems which respond to these increased structural loads and hazards. Integrating soil factors into design will be further formalized under the California Seismic Hazards Mapping Act of 1990. The regulations implementing the Act require that the local agency review of the developers' studies be "conducted by a certified engineering geologist, or registered civil engineer, having competence in the field of seismic hazard evaluation and mitigation." This increased level of review by appropriate professionals will help assure that hazards resulting from soil conditions will be adequately mitigated.

POLICY 2.1

Assure that new construction meets current structural and life safety standards.

The Department of Building Inspection and the Fire Department have ongoing responsibility for reviewing plans for proposed buildings and inspecting buildings under construction to insure that they are built as shown on the approved plans and in accordance with codes. This includes ongoing training for plan checkers and the involvement of professional structural and civil engineers with expertise in seismic engineering.

The engineering of complex or unusual structures requires more than the routine application of set rules. It often involves creativity and judgement in solving new design problems. Because there can be considerable independent judgment required, the involvement of more than one design professional can often shed new light on structural issues, or uncover overlooked problems. The Structural Engineers Association of California recommends that, in situations where performance during an earthquake is critical, or when advanced or unusual technologies are used, structural designs should be reviewed by a qualified independent reviewer at several points during project design. San Francisco Building Code Section 105.7 allows the Department of Building Inspection to involve Structural Advisory Committees, groups of professional engineers working on a volunteer basis, to provide review on a case-by-case basis.

POLICY 2.2

Review and amend at regular intervals all relevant public codes to incorporate the most current knowledge of structural engineering.

The State of California mandates the local adoption of the California Building Code. Buildings built to these provisions are expected to resist damage from minor earthquakes, experience some non-structural damage from moderate earthquakes, and suffer some structural damage, but not collapse, from major earthquakes. The Code is updated as knowledge grows about how structures respond to earthquakes. Updates occur annually. Local governments can impose more restrictive standards than those in the State code. San Francisco adopts the State code with modifications that concern the resistance to groundshaking and hillside construction.

POLICY 2.3

Consider site soils conditions when reviewing projects in areas subject to liquefaction or slope instability.

Building codes consider soil conditions only at a very general scale. But soils conditions vary enormously throughout the City. Different soils conditions can result in very different earthquake impacts and can result in damage at other times - for example landslides. Because of the importance of soil conditions, the Department of Building Inspection requires geotechnical reports for projects in areas with

susceptibility to ground failure, including liquefaction and landslides. These areas are shown on Maps 4 and 5. DBI requires that foundations and structural systems be designed that are more likely to survive these hazards. DBI has ongoing contracts with private geotechnical firms with whom it consults about proposed projects the Department believes present difficult or unusual issues in areas with the potential for ground failure.

Pursuant to the Seismic Hazards Mapping Act, the State of California Department of Conservation Division of Mines and Geology has designated Seismic Hazards Studies Zones, and mandates procedures for the review of required geotechnical reports for proposed projects in these zones. The regulations require that local agency review of these projects be "conducted by a certified engineering geologist, or registered civil engineer, having competence in the field of seismic hazard evaluation and mitigation." DBI intends to use the Section 208 provision to comply with this regulation.

EXISTING STRUCTURES

Many of San Francisco's buildings, other structures, and lifelines were built before building codes and construction practices reflected a knowledge of earthquake resistance design. Some types of older buildings have performed well in earthquakes, notably wood frame residential buildings. Other building types have not. Reducing casualties and other impacts of earthquakes requires examining existing facilities and considering the best way to reduce their hazards. San Francisco, the State of California and utility providers have programs currently underway to reduce these hazards. There remain some large classes of buildings which are likely to suffer severe damage, and to threaten life safety. The City needs to consider ways to reduce these risks.

POLICY 2.4

Continue the unreinforced masonry building program and the parapet program.

The City has undertaken two programs to reduce earthquake hazards presented by some existing buildings. Enacted in 1969, the Parapet program requires private property owners, even with no other remodeling plans, to reinforce older parapets and roofline appendages. These features, if not securely anchored to the building, pose a high life safety threat during earthquakes. This problem is most common on unreinforced masonry and concrete buildings built prior to 1949. This program is largely complete. Structural engineers have credited the strengthening performed pursuant to the parapet ordinance with preventing injuries and building damage which might otherwise have occurred during the Loma Prieta Earthquake.

The 1974 *Community Safety Element* specifically examined unreinforced masonry buildings (UMBs), because of their record of poor performance in earthquakes. Eight deaths during the Loma Prieta earthquake resulted from damaged UMBs. In the Loma Prieta earthquake about 13% of all San Francisco UMBs were damaged to the extent that occupancy was limited, while about 2% of other San Francisco buildings were damaged.

The City is requiring the retrofit of UMBs. As of late 1994, there were about 1750 UMBs in the City, concentrated in the North of Market/Civic Center area, Chinatown, Downtown, and the Bush Street Corridor. The City's program requires the retrofit of privately owned UMBs by 2006, depending on the use of the building, its location in areas of poor soil, or in parts of the City with high population densities. The retrofit program is administered by the Department of Building Inspection. A City loan program assists owners to undertake this work. The programs were designed to minimize the displacement of residents and commercial tenants.

POLICY 2.5

Assess the risks presented by other types of potentially hazardous structures and reduce the risks to the extent possible.

There are other building types which perform poorly in earthquakes. Buildings of these types exist in San Francisco, although they have not been inventoried. The most serious hazard, and also the most difficult policy issues, may be posed by non-ductile concrete frame structures. In many of these buildings, the frame was not designed or constructed to allow it to move without fracturing. As a result, they are susceptible to collapse in strong earthquakes. There were many failures of these buildings in the 1971 San Fernando earthquake. Many deaths in the 1985 Mexico City, 1988 Armenia, 1994 Northridge, and 1995 Kobe earthquakes resulted from failures of non-ductile concrete frame buildings. Most of the San Francisco freeway viaducts seriously damaged in the Loma Prieta earthquake, and the Cypress viaduct which collapsed in Oakland, were non-ductile concrete structures. Non-ductile concrete frame buildings were constructed as factories, warehouses, or office buildings in the densest parts of the City until the San Francisco building code was changed in 1968 to require ductility. ABAG estimated that more than 30% of the commercial building stock and more than 50% of the industrial building stock is concrete. An unknown but large number of these are of non-ductile concrete. Many of these buildings probably have historical or architectural value. Because of their larger size and central location, non-ductile concrete frame buildings are often converted to new uses such as offices or residential units. Such conversions provide opportunities to increase their resistance to collapse during earthquakes.

Precast concrete tilt-up buildings built before 1973 have been one of the most hazardous newer buildings types in strong earthquake. (They are called "tilt-up" because the exterior concrete walls are formed and poured in a horizontal position and lifted into place with a crane.) There are believed to be relatively few of these buildings in San Francisco.

POLICY 2.6

Reduce the earthquake and fire risks posed by older small wood-frame residential buildings through easily accomplished hazard mitigation measures.

"Soft-story" buildings, those in which at least one story—often the ground floor—has much less rigidity and/or strength than the rest of the structure, are significant hazards. Those built before 1940 often do not have adequate anchors between the frame and the foundation. They often have ground-story garages which leave the ground story without sufficient lateral strength to resist strong shaking. The 1974 URS/Blume report identified smaller wood-frame buildings with soft stories as having the potential to collapse during an earthquake. During both the Loma Prieta and the 1994 Northridge earthquakes, soft-story residential buildings failed, resulting in deaths.

These deficiencies can be fixed relatively easily and inexpensively, substantially reducing life safety hazards and the likelihood that the building will sustain damage in an earthquake. There are currently no requirements to undertake this work, although many owners do so voluntarily. Insurance companies sometimes encourage or require upgrade as a condition of providing insurance. The State of California requires sellers of homes built before 1960 to disclose the existence of a series of common weaknesses, including lack of foundation bolts and water heater bracing, and to provide a copy of the state publication, The Homeowners Guide to Earthquake Safety. This law does not require sellers to fix these deficiencies. The City of Berkeley has a program which rebates a portion of the City's real estate transfer tax, if the money is applied to the mitigation of seismic hazards. This program has funded over 1700 retrofits since it began in 1993. The City of San Leandro has published guidelines, and provides technical assistance to encourage owners of small wood-frame homes to reduce their seismic risks.

The City should consider incentives and regulations to encourage relatively simple retrofit approaches that increase the structural stability and safety of smaller wood frame residential buildings.

POLICY 2.7

Abate structural and non-structural hazards in City-owned structures.

Both technical and financial resources are needed to repair and retrofit City-owned structures. The City shall utilize its capabilities to assess hazards and to create and implement bond and other funding opportunity and to carry out retrofit projects. A number of City buildings have already been structurally upgraded utilizing bond financing.

There are other important City-owned buildings which present seismic risks, but for which funding for retrofit or replacement has not yet been secured. Among the most critical are nine subsidiary buildings at the Laguna Honda Hospital complex and 18 at the San Francisco General Hospital complex that are vulnerable to severe earthquake damage. The Hall of Justice is also vulnerable. These projects should be considered for future bond measures.

POLICY 2.8

Preserve, consistent with life safety considerations, the architectural character of buildings and structures important to the unique visual image of San Francisco, and increase the likelihood that architecturally and historically valuable structures will survive future earthquakes.

Older buildings are among those most vulnerable to destruction or heavy damage from a large earthquake. They may not have the more recent engineering features that make buildings more resistant to ground shaking, and many of them are located in areas near the Bay and the historic Bay inlets that were among the earliest parts of the City to be settled, and have the softest soil. The part of the City most vulnerable to fire, the dense downtown area, also contains many historic structures. A major earthquake could result in an irreplaceable loss of the historic fabric of San Francisco. The City needs to achieve the related goals of increasing life safety and preserving these buildings for future generations by increasing their ability to withstand earthquake forces.

When new programs are being considered to abate hazards posed by existing buildings and structures, the likely impacts of those programs on historic buildings must be thoroughly investigated. The resulting programs should encourage the retrofit of historic buildings in ways that preserve their architectural design character while increasing life safety. When development concessions, transfers of development rights or City funds are granted to promote preservation of historic buildings, there should be reasonable measures taken to increase the building's chances of surviving future earthquakes.

PLANNING FOR NEW DEVELOPMENT

POLICY 2.9

Consider information about geologic hazards whenever City decisions that will influence land use, building density, building configurations or infrastructure are made.

The Planning Commission and other City decision-makers shall consider geologic hazards when making decisions that will affect the types and structures that will exist in the future, including potential and existing structures, land uses and their associated densities, transportation and other infrastructure. Area plans and other changes to the General Plan and the City Planning Code shall investigate and consider the hazards resulting from geologic conditions, buildings (both existing and potential), and infrastructure. These plans will strive to minimize the casualties and property loss from natural disasters.

LIFELINES

San Francisco's lifelines are part of regional systems that extend well beyond the City's boundaries. State and private agencies operate some of the regional lifelines. Caltrans operates most of the regional transportation network, which is vulnerable to earthquake damage resulting in significant impacts on San Francisco.

Many areas may be without power, at least temporarily, during some portion of the first 72 hours or longer. Natural gas systems will probably experience breaks in major transmission lines and innumerable breaks in the local and individual systems, particularly in areas of poor soils. Telephone communications will be hampered by overloading resulting from many calls being placed and from phones knocked off hooks.

A Hayward fault earthquake will result in heavy damage to the City operated water system because major tunnels, aqueducts, and water distribution facilities cross the fault, resulting in possible long term water shortage. Many areas will probably be dependent on tanker trucks to provide water. Sewage collection systems and sewage treatment facilities on poorer soils near the Bay are likely to suffer damage, resulting in the discharge of raw sewage into the Bay.

POLICY 2.10

Identify and replace vulnerable and critical lifelines in high-risk areas.

The Water Department and the Department of Public Works have ongoing programs to replace vulnerable water mains and sewers and to improve performance of the systems during earthquakes by including system segmentation, safety shut-off systems and redundant back-up systems or other methods of reducing damage and providing alternative sources of service. Pacific Gas and Electricity has an ongoing program, with the goal of reducing the vulnerability of the regional gas and electric networks to earthquakes by the year 2000. Caltrans has bridge and highway retrofit programs underway. Lifeline work may present opportunities to coordinate construction activities. If coordination is possible, it should be vigorously pursued.

POLICY 2.11

Reduce hazards from gas fired appliances and gas lines.

A large earthquake is likely to result in fires at a time when the water systems may be disrupted and personnel needed to fight fires may be overtaxed. One of the sources of ignition will be gas leaks from appliances. The City should consider ways of reducing ignitions from gas-fired appliances by potential code amendments to encourage reduction of gas related hazards.

HAZARDOUS MATERIALS

POLICY 2.12

Enforce state and local codes that regulate the use, storage and transportation of hazardous materials in order to prevent, contain and effectively respond to accidental releases.

Homes, businesses and other facilities contain many materials that, if not properly handled, can result in risks to life, health, or the environment. During a disaster, especially an earthquake, such materials could be accidentally released. The materials that generally pose the greatest hazard during a disaster are those that can, in the form of gas, spread and affect large numbers of people; those that are highly flammable or explosive; and those that are highly toxic or are strong irritants. Large earthquakes lead to release of hazardous materials while reducing the ability of emergency personnel to respond. The continued requirement of business and facility emergency plans and local inspections as part of the City's permitting process for hazardous material storage is critical to reducing an overload on public emergency response resources during a major earthquake.

3. EMERGENCY PREPAREDNESS AND RESPONSE

OBJECTIVE 3

ENSURE THE PROTECTION OF LIFE AND PROPERTY FROM DISASTERS THROUGH EFFECTIVE EMERGENCY RESPONSE. PROVIDE PUBLIC EDUCATION AND TRAINING ABOUT EARTHQUAKES AND OTHER NATURAL DISASTERS AND HOW INDIVIDUALS, BUSINESSES AND COMMUNITIES CAN REDUCE THE IMPACTS OF DISASTERS.

The City agencies with lead roles during the response phase of a natural disaster, a catastrophic hazardous waste incident, a large-scale crime or terrorist attack, are the same agencies that have a day-to-day responsibility for responding to fires, accidents, crimes or other emergencies: the Fire Department, the Department of Public Health, the Police Department, the Department of Public Works, and others to a lesser extent and as needed. However, in a major disaster, the needs for assistance are greater than the resources of the usual responders; in fact this could be said to be the definition of a disaster. During and after a major disaster additional organizations, including City agencies, other public safety agencies, and private organizations, will be called into service. Therefore, a significantly heightened level of coordination, and different type of organization, is necessary. The Mayor's Office of Emergency Services (OES) is responsible for this coordination. The Emergency Operations Plan (EOP), recently updated, is the blueprint for this coordination among city responders, other governmental agencies, non-governmental agencies involved in response (such as the American Red Cross), and the public during a major disaster of any kind.

Before a disaster occurs, actions should be taken by members of the public, families, neighborhood groups, businesses, and community-based organizations to reduce risks and plan for the actions that will be needed immediately after a disaster. State and local emergency response offices advise people to be prepared to be self sufficient for 72 hours after a large earthquake. Achieving preparedness is even more critical for vulnerable populations, including the elderly and the disabled, and those in geographical areas and building types that are more vulnerable to earthquake damage.

POLICY 3.1

Promote greater public awareness of disaster risks, personal and business risk reduction, and personal and neighborhood emergency response.

People and organizations that are well-informed about possible disasters can take private and effective measures to reduce their vulnerability and prepare. They can also increase their effectiveness in responding after a disaster and helping others when public agencies are overwhelmed.

POLICY 3.2

Provide on-going disaster preparedness and hazard awareness training to all City employees.

In addition to responding to the emergency, one of the post-disaster tasks of City agencies will be the resumption of normal public services as quickly as possible. City workers will be more effective emergency responders, will be able to provide necessary public service, and will be better equipped to aid in the recovery if they are not, themselves, victims of the disaster.

POLICY 3.3

Maintain a local organization to provide of emergency services to meet the needs of San Francisco.

The Mayor's Office of Emergency Services has responsibility for developing the City's Emergency Operations Plan, facilitating the coordination of the response agencies, conducting periodic exercises

and maintaining the Emergency Command Center. This agency must be maintained at an appropriate level, with sufficient personnel and resources to carry out these tasks.

POLICY 3.4

Maintain a comprehensive, current Emergency Operations Plan, in compliance with applicable state and federal regulations, to guide the response to disasters. Conduct periodic exercises of the EOP.

The Emergency Operations Plan is needed to insure that the roles of City Agencies and others are well defined and periodic exercises sharpen the skills and interest of all those involved in response. Such exercises, and the experiences of others during disasters facilitate required updating of the EOP.

POLICY 3.5

Maintain an adequate Emergency Command Center.

A secure well-equipped location for centralized communications and direction is needed after a large disaster. Although the 1974 Community Safety Element recommended an Emergency Operations Center be established to serve as a central coordination point for the emergency response, when the Loma Prieta earthquake struck in 1989 there was no center. Shortly thereafter, an Emergency Command Center (ECC) was built and communications systems installed. It is managed by the Mayor's Office of Emergency Services.

POLICY 3.6

Maintain and expand the city's fire prevention and fire fighting capability with adequate personnel and training. Assure the provision of adequate water for fighting fires.

The supplemental water supply systems including the Auxiliary Water Supply System, the Portable Water Supply System, cisterns, Bay water suction devices, and fire boats have been extended and strengthened since the Loma Prieta earthquake. Staffing and equipment needs of the Fire Department must also be met.

POLICY 3.7

Establish a system of emergency access routes for both emergency operations and evacuation.

After a large earthquake or other disaster, it is likely that many streets will be impassible. This will make fire fighting and other emergency response actions more difficult, hinder the movement of residents, and interfere with debris removal and other short-term recovery activities. The City and Region should have post disaster transportation plans.

4. RECOVERY AND RECONSTRUCTION

OBJECTIVE 4

ASSURE THE SOUND, EQUITABLE AND RAPID RECONSTRUCTION OF SAN FRANCISCO FOLLOWING A MAJOR DISASTER.

A major disaster resulting in extensive destruction in the City will result in a public and private commitment to rebuild San Francisco, and to do so as quickly as possible, while providing needed interim facilities where people can live, conduct businesses, and provide services.

The rebuilding of areas with extensive damage will present choices between retaining existing land uses, regulations, land ownership patterns, circulation and infrastructure configurations, and other physical characteristics as they existed before the disaster, or, alternatively, reconsidering the area's physical patterns, or a combination of the two approaches.

While these issues are being considered, the City's established development objectives and procedures (embodied in the General Plan) should be respected. A balance should be struck to enable new development to take advantage of opportunities to improve the area and the city, enhance future safety, upgrade infrastructure, encourage economic recovery, and result in attractive and functional physical development, while respecting the values of the past. Some areas might best be repaired and rebuilt in ways similar to their pre-disaster conditions, while in others with pervasive damage, new area plans applying citywide objectives may be needed.

Preparation and planning prior to a disaster can improve the effectiveness of post-disaster efforts. Many of the immediate actions needed to begin the recovery process, such as debris removal, emergency building assessment and repairs, and meeting the immediate needs of federal and state agencies for information, are described in the Emergency Operations Plan. Longer-term reconstruction decisions will need to be made by decision-makers including the Mayor, the Board of Supervisors, the Planning Commission and others, with considerable public involvement. Advance planning for the recovery process will improve the City's ability to make these decisions, which will profoundly influence the future of the City, quickly, equitably, and effectively.

POLICY 4.1

Rebuild after a major disaster in accordance with established General Plan objectives and policies and other relevant policies and regulations.

The General Plan and other City policies have been adopted, after much public consideration, to assure the preservation and enhancement and safety of this very desirable urban environment. In the efforts to restore damaged areas of the city, existing development policies and regulations should be respected. Opportunities may be created for realizing General Plan policies, such as improvements to circulation systems, the provision of needed public or private open space, or hazard reduction. In areas with extensive building and infrastructure damage, coordinated rebuilding to take advantage of opportunities for neighborhood improvement, may be best achieved with an area plan approach. Future Area Plans of the General Plan should be formulated with an awareness of their potential applicability in relation to earthquake recovery.

POLICY 4.2

Repair and reconstruct damaged neighborhoods so that displaced residents are able to return to the communities where they lived. Involve pre-disaster residents, businesses, and owners in planning for the reconstruction of destroyed and damaged areas.

San Francisco neighborhoods have distinct characters, and often have long-term residents, businesses and institutions. Some of the neighborhoods most vulnerable to serious damage in an earthquake provide affordable housing and have distinct cultural identities. The City, in cooperation with State and federal agencies, and community-based organizations, must manage rebuilding so as to maintain affordability to assure that the disaster does not result in permanent displacement due to higher housing costs.

Residents, business people, and those involved in neighborhood institutions need to be involved in creating repair and rebuilding plans. Those plans must provide opportunities for those who lived in the area to return to new or repaired homes and other facilities there.

POLICY 4.3

Provide adequate interim accommodation for residents and businesses displaced by a major disaster in ways that maintain neighborhood ties and cultural continuity to the extent possible.

After a major earthquake, the Association of Bay Area Governments has estimated that up to 23,000 housing units will be destroyed or substantially damaged. (This is the estimate of red-tagged units in San Francisco after an earthquake along the entire Hayward Fault.) Many businesses that provide necessary services to residents will also be displaced. Repair and reconstruction will take several years. In the meantime, State and federal agencies have a responsibility to provide interim housing. The City will work with these agencies, involving community-based organizations, to assure that the temporary and interim housing is adequate, convenient and includes necessary businesses and social services. In order to maintain relationships and connections within the community, temporary housing and other facilities should be provided near their pre-disaster location as much as possible.

POLICY 4.4

Before an emergency occurs, establish an inter-departmental group to develop a Recovery Plan to guide long-term recovery, manage reconstruction activities, and provide coordination among recovery activities.

Inter-departmental coordination and public involvement will be critical to the recovery process. So will coordination with state and federal agencies and familiarity with their rules and processes. A Recovery Plan should be prepared involving City departments with responsibility for the physical and economic health of the City, including the Planning Department, the Redevelopment Agency, the Department of Public Works, the Department of Building Inspection, the Mayor's Office of Community Development, the Mayor's Office of Housing, and others. The Mayor's Office of Emergency Services should also contribute.

The Recovery Plan will need to prepare the City to meet immediate changing needs after a disaster. Special services and facilities will be needed on a short-term basis, including temporary housing, commercial facilities, and community services. It may be necessary that they be located in areas not normally available for development, or at higher density than is normally allowed.

The Recovery Plan should include, at least, polices and potential programs addressing the following issues, including a consideration of what type and size of disaster would trigger their implementation:

- Emergency demolitions, including a consideration of historic buildings.
- Reoccupancy guidelines
- Expediting repairs and reconstruction where appropriate
- Construction of a potentially large amount of temporary housing and related services, including consideration of siting
- Plans for expediting the planning, financing and construction of potentially large numbers of replacement housing units.
- Changes to Planning Code provisions regarding nonconforming uses and buildings.
- Business resumption assistance, including mediation with federal and state programs and the provision of alternative space.
- Guidance for long-term economic recovery.
- Policies for guiding planning and reconstruction of areas in which a large proportion of the buildings and infrastructure are destroyed, including the most effective use of the City's redevelopment powers.
- Plans for the rapid resumption of normal government services
- Coordination with federal and state agencies.

The Recovery Plan should be updated as necessary to reflect changing conditions, and changes in the state and federal regulations that will influence the post-disaster recovery financing.

5. INFORMATION SYSTEMS AND RESEARCH

OBJECTIVE 5

SUPPORT SEISMIC RESEARCH THROUGH APPROPRIATE ACTIONS BY ALL PUBLIC AGENCIES, AND APPLY NEW KNOWLEDGE AS IT BECOMES AVAILABLE.

POLICY 5.1

Participate actively in the State of California, Department of Conservation, Division of Mines and Geology's Seismic Hazard Mapping project.

The California Division of Mines and Geology (CDMG) has mapped Seismic Hazards Studies Zones (SHSZs) in the north part of the City. When development projects are proposed within the SHSZs, the Seismic Hazards Mapping Act requires project proponents to prepare a geotechnical report assessing the nature and severity of the hazard, and suggesting appropriate mitigation measures. When approving any project in a SHSZ, the City uses the information and recommendations included in the report to achieve a reasonable protection of public safety. The City must take the information contained in the maps into account when preparing the Safety Element, or when adopting or revising land use ordinances. The CDMG is now mapping the southern part of the City. City agencies, including the Department of Public Works, the Department of Building Inspection and the Planning Department, will continue to cooperate with and advise the CDMG in this project.

POLICY 5.2

Support and monitor research being conducted about the nature of seismic hazards in the Bay Area, including research on earthquake prediction and warning systems, on the risk of tsunamis, and on the performance of structures.

Knowledge about geologic risks in the Bay Area is substantial, but always evolving. The City needs to keep informed, through the professional contacts of its staff, and through State and federal agencies like the California OES and the United States Geological Survey, about advances in the field. New information will be shared with the public and decision-makers.

Before an emergency occurs, establish an interdepartmental group to develop a Recovery Plan to guide long-term recovery, manage reconstruction activities, and provide coordination among recovery activities.